

PART ONE -
SERVICE AREA GOALS

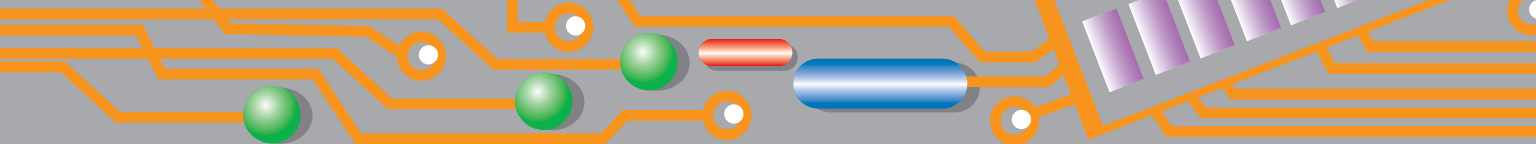


STRATEGIC PLAN
FOR SCOTTSDALE

**INTELLIGENT
TRANSPORTATION
SYSTEMS**



APRIL 2004



Objectives of Scottsdale ITS:

- Hold travel time on City streets steady, and where possible, reduce travel time, even as traffic volume increases due to growth.
- Reduce traffic incident delay.
- Communicate rapidly among Police Department, Emergency Services, Arizona Department of Transportation, Fire, vehicle drivers and Traffic Management Center to enhance roadway safety.



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Strategic Plan for Scottsdale Intelligent Transportation Systems

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PART I SERVICE AREA GOALS

Purpose of the Scottsdale Strategic Plan for Intelligent Transportation Systems

The Scottsdale Strategic Plan for Intelligent Transportation Systems (ITS) is intended to

- guide the deployment and operation of advanced traffic management technology in an integrated Citywide fashion while preserving regional relationships, to create a sustainable Scottsdale advanced traffic management system.

With ITS, advanced technology is used to coordinate signals and improve traffic progression, reduce incident clearance times, improve real-time traveler information, improve bus progression, and enhance special event traffic management.

The ITS Strategic Plan for Scottsdale serves multiple purposes. It guides the deployment, management and operation of advanced traffic management technology in Scottsdale. It also serves as an educational tool. The plan will be reviewed annually during the City budget evaluation. Operating plans need to keep pace with changing technology and to evolve with the City's changing resource environment.

Part I of the Strategic Plan summarizes the resource needs for advanced traffic management as ITS continues to be built. Part I also sets out the adopted goals and objectives for the four ITS service areas developed by the ITS Advisory Board: Signal Coordination, Incident Detection, ITS Maintenance, and Work Zones. Appendix I contains the four Service Area Plans.

Part II of the Strategic Plan (available on the City of Scottsdale website www.ScottsdaleAZ.gov, keywords *traffic management* or by request) provides the background of the program in Scottsdale, and a fuller development of issues. Questions about the Strategic Plan should be directed to the Scottsdale Transportation Department, Janet Secor, (480) 312-2389, jsecor@scottsdaleaz.gov.



What Is ITS?

ITS is the implementation and management of advanced traffic surveillance, signal, and control systems to improve the safety and efficiency of roadways.

ITS represents a shift toward further automating traffic signal control and roadway congestion response. Automation permits quantum improvements to intersection and corridor traffic flow programming. Automation can make travel time more predictable. It helps City staff react quickly and in a targeted fashion to bottlenecks. Automation enables a regional solution to traffic issues. Automation also changes the resource mix and management of traditional traffic operations.

Acknowledging emerging operational changes, the Scottsdale Transportation Department, in the Summer of 2003, convened a steering committee of City stakeholders—the ITS Advisory Board. The Board was challenged to learn about ITS and to devise a strategy for making the most efficient and effective use of ITS infrastructure being constructed and acquired in Scottsdale. Since 1997, the City has invested \$5.3 million in advanced traffic management infrastructure. Another \$12.5 million is planned on the fiscal year 2004-08 Capital Improvement Plan.

Scottsdale ITS devices are integrated with a central coordinated electronic traffic signal system. Devices are linked to a Traffic Management Center (TMC) in the One Civic Center building, where TMC professionals manage and operate the signals and Variable Message Signs (VMS) using real-time information.

Traffic congestion affects Scottsdale competitiveness. A 2003 analysis of Scottsdale priorities, *Which Way Scottsdale*, highlighted that ease of getting around is a vital amenity necessary to attract future Scottsdale residents. The same report re-emphasized that Scottsdale traffic congestion is the top on-going complaint of current citizens.

ITS, properly deployed and operated, reduces congestion related to high traffic volumes, incidents and special events that reduce the overall quality of life of the community.

What ITS Benefits Have Been Documented?

Signal timing is a powerful tool for moving traffic, and ITS automation enables rapid, effective signal timing changes. An April 2003 consultant report, “Indian School Road Corridor Intelligent Transportation System Evaluation,” found that the technology potentially doubles the annual TMC staff output of basic timing changes, to 100 from 50. In the past, new or improved signal timing plans were generated every two years for specific primary corridors.

ITS technology using Closed Circuit TV cameras (CCTVs) provide TMC staff the capability to adjust timing plans daily. The Indian School Road evaluation found that with ITS, each analyst conceivably could perform 400 or more real-time signalization changes annually.

The consultant found that travel time through the 3-mile stretch of Indian School Road was reduced by up to 64 seconds, per vehicle. The consultant further estimated that with ITS, the Scottsdale Police Department saved the equivalent of 30 traffic control officers during the Barrett-Jackson Classic Auto Auction and the Phoenix Open. These Police Department resource savings were evaluated at 2,976 staff hours at \$36 an hour, or \$107,136.

On a national level, Federal Highway Administration (FHWA) documented benefits from implementing local ITS. According to FHWA, advanced traffic surveillance and signal control systems resulted in travel time improvements ranging from 8 to 25 percent reductions. Freeway management systems, primarily ramp meters, reduced crashes by 24 to 50 percent while enabling freeways to handle 8 to 22 percent more traffic at speeds 13 to 48 percent faster than pre-existing congested conditions. Incident management reduced delay associated with traffic congestion caused by incidents by 10 to 45 percent.

Why Plan?

Locally, the ITS Strategic Plan is one step toward meeting a need identified in the February 2003 Scottsdale Strategic Plan for Technology. The Technology Plan recommended development of an ITS implementation plan covering key concerns:

- Fiber vs wireless communications technology.
- Public safety, emergency preparedness, and planning information requirements and access.
- Training requirements.
- TMC alternatives, requirements and costs.
- Staffing and organizational requirements.
- Maintenance and operation requirements costs.
- Public information dissemination.

Nationally, the ITS Strategic Plan is a step toward meeting criteria set out by FHWA based upon lessons learned through the first 10 years of ITS deployment — to ensure that ITS operates as expected, is used as planned, and can be easily maintained (see box at right).

National Criteria for ITS Planning

ITS should have an effective long-term plan for operations to facilitate the transition from deployment to operations.

The cost of a project's operation and maintenance should be identified in the project planning stage, and the impacts of the costs should be addressed.

The life cycle of each operational improvement should be considered.

Operations and maintenance costs should be addressed early in the project to bring the need for continued funding before elected and appointed officials.

Staff responsible for different functional areas should be encouraged to provide input during the different phases of the project.

Source: FHWA



Results of the Strategic Planning Process

ITS benefits traffic management most effectively when tools are used by sufficient, competent staff, a key ITS component. Resources required for operations and maintenance are driven by the services and levels desired, the number and types of ITS devices deployed, and technology.

Most of Scottsdale's advanced traffic management operating budget increases probably will be attributable to 1) growth in the number of TMC staff, 2) device and communication infrastructure repair and replacement funding, and 3) communication leasing costs. A number of staffing models and metrics were reviewed for the Strategic Plan. For example, the City of Menlo Park, California, staffs ITS operations and maintenance on the basis of one traffic signal technician for every 50 traffic signals, and one traffic signal engineer for every 100 traffic signals.

In 2003, the Scottsdale traffic management system comprises 806 ITS devices-260 signals and 260 signal controllers, and 286 other ITS

devices. In fiscal year 2003/04, the City has budgeted \$1.6 million to operate and maintain the ITS-enabled traffic management system, mostly in the Municipal Services Department. The Municipal Services Department spends \$1.1 million annually to provide electricity to and to maintain the traffic signals. The Transportation Department spends about \$500,000 a year total to manage traffic flow and signalization, and to operate and maintain the TMC and other ITS devices.

At build out, in 2009, Scottsdale will have deployed 1,246 devices, as well as various communication technologies.

Sources of funds for program operation will need to be identified and requested during the annual City budget process. However, as is the case for technology planned by Information Systems, planning for ITS operations and infrastructure should progress at the same time to achieve the maximum efficiency and effectiveness for City resources.

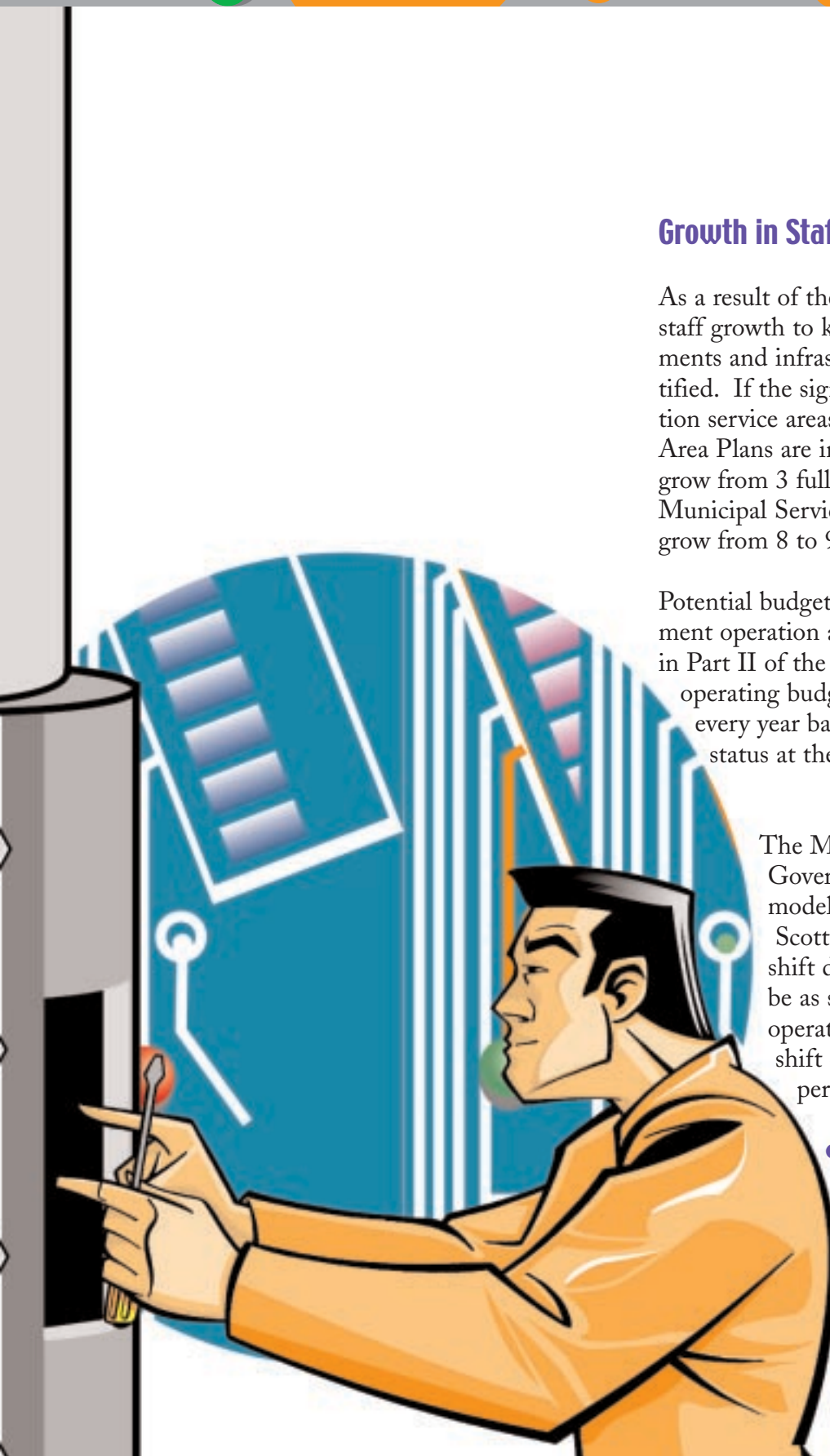
Growth in Staff

As a result of the planning process, targets for staff growth to keep pace with service enhancements and infrastructure deployment were identified. If the signalization and incident detection service areas discussed below in the Service Area Plans are implemented, TMC staff should grow from 3 fulltime staff to 6 by June 2006. Municipal Services Traffic Signal unit should grow from 8 to 9 fulltime staff.

Potential budgets for advanced traffic management operation and maintenance are contained in Part II of the Strategic Plan. Capital and operating budget requests will be formulated every year based upon ITS implementation status at the time.

The Maricopa Association of Governments' regional ITS staffing model suggests that the ultimate Scottsdale TMC staff for a 12-hour shift during a 5-day workweek would be as shown below. Additional TMC operating hours would require other shift configurations of essential personnel.

- 1 ITS Manager
- 1 traffic engineer specializing in signalization
- 1 incident management coordinator
- 4 system operators (peak hours)
- 2 technicians



Operating Expenditures

In addition to the staff needs, FHWA suggests that an annual allocation equivalent to 15 percent of ITS infrastructure cost should be programmed for leases, repairs, replacements, and operating costs such as electricity. Based upon this, total Scottsdale advanced traffic management operating budget, net of labor costs, is predicted to be \$1.1 million, at current levels. The actual fiscal year 2003/04 operating budget, net of personnel costs, is \$.8 million. The current budget does not include a replacement fund for infrastructure.

We also modeled the current Scottsdale ITS deployment on the FHWA ITS Deployment Analysis System (IDAS). The model reported that we should be budgeting \$2.1 million annually for operations, net of labor costs. IDAS reports that the planned deployment of 31 additional CCTVs and 10 more miles of fiber optic cable by 2004, should incur additional operations and maintenance of \$54,600 annually.

Capital Expenditures

The capital plan for ITS infrastructure for 2003/04 to 2007/08 appears on the current City 5-year capital budget. The infrastructure is funded by a combination of Scottsdale sales tax revenue restricted for transportation, City general obligation bonds, and federal grants. Physical plant to house a larger staff will need to be incorporated into the capital budget.

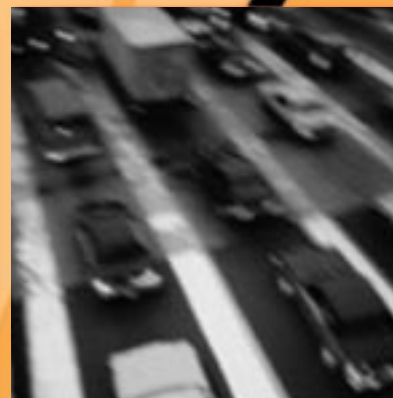
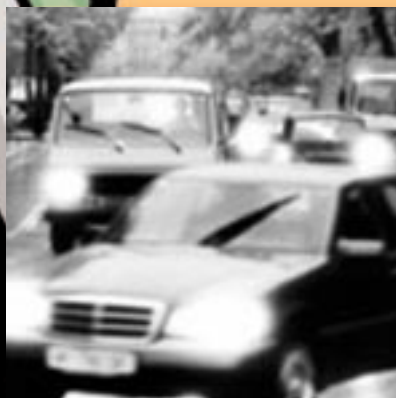
ITS deployment strategy is changing to migrate communication to a type that is compatible with the City's standard computer network. This change will enable the public to access traffic information by means of the Internet. Migration also will enable efficiencies in maintenance support, which can be provided by existing Information Systems staff. A pilot project for wireless communication will also be deployed and evaluated. Successful incorporation of wireless technology has the potential to reduce significantly communications infrastructure costs.

ITS Program Strategic Goals and Objectives

Scottsdale's ITS Goal is to keep traffic moving through technology.

Objectives of Scottsdale ITS:

- Hold travel time on City streets steady, and where possible, reduce travel time, even as traffic volume increases due to growth.
- Reduce traffic incident delay.
- Communicate rapidly among Police Department, Emergency Services, Arizona Department of Transportation, Fire, vehicle drivers and Traffic Management Center to enhance roadway safety.



Dozen Service Areas Evaluated

As a result of the strategic planning process, goals, objectives, and strategies for deploying, securing, operating, and maintaining Scottsdale ITS were identified.

The ITS Advisory Board selected and ranked 12 ITS service areas that members believed were needed for Scottsdale:

- Signal Coordination
- Work Zones
- Incident Detection
- Archived Data
- Event Management
- Public Outreach and Education
- Public Notification
- Automatic Vehicle Locaters on City Vehicles
- Motorists Assistance
- Road Weather Management
- ITS Maintenance
- Parking Management

A working group of the ITS Advisory Board, the ITS Technical Team, developed the Service Area Plans, laying out types and levels of services, implementation approaches, and resource implications. The Team developed four Service Area Plans, focusing on the highest priority areas. Development of Service Area Plans for the remaining Service Areas was deferred.

As a result of the planning process, partnerships between the Transportation Department, Police Department, Emergency Services, Information Systems and other municipalities' staffs were strengthened. Stronger partnerships benefit joint operations and better serve the people who travel throughout Scottsdale. Service Area Plans will serve as templates for project staffing and management, and as guides for further tactical planning.

Four Priority ITS Service Areas Recommended for Scottsdale

The ITS Advisory Board reviewed and accepted four Service Area Plans to guide construction, acquisition, security, operation and maintenance of Scottsdale ITS.

Four Service Areas are recommended as priorities for Scottsdale: Signal Coordination, Incident Detection, ITS Maintenance, and Work Zones. Each is discussed separately in the remainder of this document. Appendix I contains the complete Service Area Plans.

Signal Coordination Service Area

Definition: traffic signal control is responsible for the coordinated control of traffic signals in response to changes in demand patterns. Key measures are Level of Service (LOS) and travel time delay.

Goal

Operate signals so that traffic delay grows at a slower rate than traffic volume.

Objectives

1. Reduce or hold peak period travel times to less than 1 percent annual increases on major City streets, beginning in 2005.
2. Complete the installation of 18-mode signal plans on all of the signals within the City by March 2004.
3. Maintain LOS at key intersections and major corridors at D or better beginning in 2005.
4. Develop a LOS report and create a LOS map for the City by January 2004.
5. Develop a second LOS report and map by January 2006, to report pre/post metrics.
6. Begin installing traffic signals that automatically adjust for congestion by 2010.

Achievement Challenges:

- Fifteen of 30 City intersections (of 260 total) last studied by the City were LOS “F” due to needed changes in intersection configuration.
- No LOS report has been produced since 1997. One is planned for publication in the Winter of 2003.
- Actual major-to-major intersection LOS needs to be determined.
- Data from turning movement counts and other sources needs to be provided and used, and modeling for traffic signalization purposes needs to be performed.
- Measurement of travel times needs to be routinely performed.

Incident Detection Service Area

Definition: incident detection is the sensing of unanticipated delay on the roadways, and communication to agencies and the public to mitigate delay. Key measures are travel time delay, incident clearance time, and secondary incidents.

Goal

Minimize the effect of incidents on traffic flow so that roadway efficiency and safety is enhanced.

Objectives

1. Reduce the average duration of incidents on major arterials by 5 minutes annually, beginning in July 2004.
2. Staff for incident detection in the TMC during peak traffic hours by June 2004.
3. Implement an alarm to signal a delay condition on roadways by 2004.
4. Establish consensual formal methods of communication about detected incidents to responsible parties by June 2004.
5. Implement delay condition reports on City Web site for public notification by July 2005.

Achievement Challenges

- To achieve the maximum benefit from continuing ITS deployment, additional TMC staff will be needed.
- A position description for TMC operator needs to be documented.
- Procedures should be developed to tabulate Police Department data on duration of incidents on major arterials.
- Budget and commitment to train TMC staff about incident detection are needed.

ITS Maintenance Service Area

Definition: Maintenance is an activity that is required throughout the TMC life cycle to ensure that the system operates as originally planned and designed. It is a series of methodical, ongoing activities designed to minimize the occurrence of systemic failures and to mitigate their impacts when failures do occur. Key measures are response and down times, and life cycle cost.

Goal

Maintain infrastructure in excellent operating condition so that preventable roadway delay is avoided, and roadway safety is enhanced.

Objectives

1. Issue Requests for Proposals for maintenance contractors for fiber, wireless and CCTVs with a 24-hour response clause by December 2003.
2. Track failures by device to eliminate re-occurring failures of the same nature by December 2003.
3. Implement an As-Built & Blue Stake Program related to ITS facilities so that locations can be marked within 48 hours of notification, by July 2004.
4. Develop a preventive maintenance program for ITS devices by July 2005.
5. Implement an inventory and spares policy, and work order system by July 2005.
6. Retrofit existing signal communication software and hardware to become Ethernet compatible by July 2005.

Achievement Challenges

- Traffic Signal Crews are not co-located with ITS/TMC, and are under the direction of a different department.

Work Zones Service Area

Definition: ITS applications including traffic management, traveler information, and incident management used to enhance the safety and efficiency of work zones for road users and roadway workers. Key measures are reduction in road closures and in accidents.

Goal

Enhance the safety of the public and reduce roadway delay. Work zone management will also track and update City worker construction and maintenance.

Objectives

1. Implement the Roadway Condition Reporting System capability of AZTech by July 2004.
2. Incorporate the Right of Way management document into the City's Design Standards and Policies Manual by July 2004.

Achievement Challenges

- The AZTech server and the communications to Maricopa County Department of Transportation are scheduled to be operational by Winter 2003.
- A process for TMC support of the Transportation Department Right-of-Way initiative needs to be developed.





Appendix 1

SERVICE AREA – SIGNAL COORDINATION

Traffic Signal Control is responsible for the coordinated control of traffic signals in response to changes in demand patterns. Key measures are Level of Service (LOS) and travel time delay.

Goal

The goal of signal coordination in the City of Scottsdale is to operate signals so that the growth in traffic delay is lower than the growth in traffic volume.

Objectives

- Reduce or hold peak period travel times to less than 1% annual increases on major arterials, beginning in 2005.
- Develop a LOS report and create a LOS map for the City by January 2004.
- Complete the installation of 18-mode signal plans on all of the signals within the City by March 2004.
- Develop a second LOS report and map by January 2006, to report pre/post metrics.
- Maintain LOS at key intersections and major corridors at D or better beginning in 2005.
- Begin installing traffic signals that automatically adjust for congestion by 2010.

ROLES AND RESPONSIBILITIES

PLANNING

Transportation Department
Budget
Capital Projects Management

SECURITY

Transportation Department
Information Systems
Contractors

IMPLEMENTATION

Transportation Department
Capital Projects Management

OPERATIONS & MAINTENANCE

Transportation Department
Traffic Signal Crew
Contractors

PROGRAMS/PROJECTS REQUIRED

Program 1: Continuous real-time adjustments to signal timing by TMC operators in response to data collected via mid-block and other detectors.

Program 2: Conduct biennial traffic studies to assess signal coordination at all identified critical intersections to determine whether LOS is D or better.

Program 3: Biennial signal synchronization mapping for major corridor movement.

Program 4: Implement a travel time measurement program.

Project A: Determine skills needed and staff hours required to run the Synchro model, to measure LOS, identify LOS problems, and develop a LOS routine report. Determine skills needed and staff hours required to develop both manual and fully automated traffic count/turning movement count programs.

Project B: Review Scottsdale signalization consistency with regional signalization biennially, and yellow and red clearance intervals of all Scottsdale intersections once every 5 years.

Project C: Evaluate automating traffic counts using vehicle detection technology.

Costs To Be Determined
MAG estimates \$1200 per signal per timing assessment.

RESOURCES REQUIRED AND ESTIMATED COSTS

CAPITAL IMPROVEMENTS REQUIRED

Install detection devices mid-block on all major arterials. See Service Area Plan for Incident Detection.

Provide workspace for additional traffic system operators.

Evaluate technology to assist in measuring travel times on major arterials.

Install traffic-adaptive traffic signals on selected intersections by 2010.

Procure software and hardware to automate traffic data collection at selected sites, by 2010.

Costs To Be Determined

HUMAN RESOURCES/STAFF REQUIRED

According to the Federal Highway Administration ITS database, labor for signal control for any size of TMC [Scottsdale is small based upon population] requires 2 operators at 50% time; 1 transportation engineer at 50% of the time; \$2,000 per month per every 10 signalized intersections, to update timing plans via consultants; & 2 signal maintenance technicians, fulltime.

Per MAG ITS Strategic Plan, a large TMC [categorized based on number of devices] like Scottsdale's, with 12-hr/5 day shift, requires 7 staff: 1 Center Manager; 1 shift supervisor; 2 operators; 1 software programmer; 1 communications technician; 1 technician. Service Areas incorporated are signal control and incident response.

Need to develop position descriptions for each TMC staff.

Per MAG, cost of personnel operations for a large TMC per year is \$476,500, in 2002 dollars, for 7 staff. Per FHWA, cost for signal control labor shown above is \$486,000 annually. In 2003, personnel cost for 3 TMC staff is \$209,000, and contractors is \$65,000.

INSTITUTIONAL ARRANGEMENTS REQUIRED

Agreement required on where traffic modeling will be administered.

Agreement required on how maintenance will be staffed for traffic signals and ITS devices.

Costs To Be Determined

ACHIEVEMENT CHALLENGES

- Fifteen of 30 city intersections (of 260 total) last studied by the City were LOS F due to needed changes in intersection configuration.
- No LOS report has been produced since 1997. One is planned for publication in the Winter of 2003.
- Actual major-to-major intersection LOS needs to be determined.
- Data from turning movement counts and other sources needs to be provided and used, and modeling for traffic signalization purposes needs to be performed.
- Measurement of travel times needs to be routinely performed.

ADDITIONAL INFORMATION

- Scottsdale signals are timed to speed.
- In 2003, all City signals are actuated/demand signals.
- The Synchro model gives the optimum signalization for a corridor, as well as intersection.
- The City has one corridor, Scottsdale Road into Tempe, which merits interjurisdictional coordination; the corridor is coordinated now with Tempe.

SERVICE AREA – INCIDENT DETECTION

Incident detection is the sensing of delay on the roadways, and communication to agencies and the public to mitigate delay. Key measures are travel time delay, incident clearance time, and secondary incidents.

Goal

The goal of incident detection in the City of Scottsdale is to minimize the effect of incidents on traffic flow so that roadway efficiency and safety is enhanced.

Objectives

- Reduce the average duration of incidents on major arterials by 5 minutes annually, beginning in July 2004.
- Establish consensual formal methods of communication about detected incidents to responsible parties by June 2004.
- Staff for incident detection in the TMC during peak traffic hours by June 2004.
- Implement delay condition reports on City Web site for public notification, by July 2005.
- Implement an alarm to signal a delay condition on roadways by 2004.

ROLES AND RESPONSIBILITIES

PLANNING

Transportation Department
Information Systems
Budget
Police Department

SECURITY

Information Systems
Transportation
Contractors

IMPLEMENTATION

Transportation Department
Police Department
Information Systems
Fire & Emergency

OPERATIONS & MAINTENANCE

Transportation ITS & Contractors
Police Department
ADOT
Traffic Signal Crew

PROGRAMS/PROJECTS REQUIRED

Program 1: Continually monitor the TMC during operational hours for incidents, and implement notification to pre-identified responders.

Program 2: Video record major incidents, hold debriefings with responders for major incidents, to learn from experience and train responsible personnel.

Program 3: Tow truck fast response incentive program to achieve 15-minute response time to clear roadways after incidents.

Program 4: AzTech connection working and staffed to share incident information regionally, and to permit remote control of select TMC devices during closed hours.

Project A: Develop pre-set detour routes and a training manual for incident identification, classification and notification.

Project B: Determine communication partners, including motorist assistance providers, tow trucks, news media, ADOT, and other area TOCs.

Project C: Evaluate the feasibility of a Scottsdale Motorist Assistance Program.

Costs To Be Determined

ACHIEVEMENT CHALLENGES

- To achieve the maximum benefit from continuing TMC deployment, additional TMC staff will be needed.
- A position description for TMC operator needs to be documented.
- Procedures should be developed to tabulate Police Department data on duration of incidents on major arterials.
- Budget and commitment to train ITS operations staff about incident detection are needed.

RESOURCES REQUIRED AND ESTIMATED COSTS

CAPITAL IMPROVEMENTS REQUIRED

Install detection infrastructure-see 5-year forward plan.

Install communication infrastructure-see 5-year forward plan.

Integration of detection devices.

Identify and procure software to activate ""alarm"" function.

Evaluate the use of wireless to implement at appropriate locations.

Install 5 Variable Message signs a year through build-out in 2009.

Costs - see below

HUMAN RESOURCES/STAFF REQUIRED

Project manager will be needed for incident detection service area for capital planning, policy/procedural development, and local/regional integration.

Labor for operators (3 @ 100K and 1 manager @ 150K) and 2 maintenance techs @ 75K per IDAS-per one shift suggested by FHWA. Need one traffic engineer.

Personnel cost for Project Manager \$110,000 annually, fully burdened. Cost for TMC incident detection staff between \$630,000 and \$770,000 annually, per FHWA IDAS.

INSTITUTIONAL ARRANGEMENTS REQUIRED

Establish an Incident Management working group of Scottsdale ITS, Police, Fire, EMS, stormwater.

Police Department/EMS incident management team to be organized.

City of Scottsdale Incident Management team to work with Regional incident management personnel.

Establish relationships with media and other partners to communicate incidents and incident-clear conditions to the public.

Costs To Be Determined

ADDITIONAL INFORMATION

detection infrastructure capital budget 04-08

| | | | |
|------------|-------------|--------------------------|--------------|
| fy 2003/04 | \$3,256,000 | future budget need | \$7,380,000 |
| fy 2004/05 | \$4,654,800 | total future requirement | \$20,056,600 |
| fy 2005/06 | \$2,697,500 | already spent | \$5,194,342 |
| fy 2006/07 | \$818,300 | PROGRAM TOTAL | \$25,250,942 |
| fy 2007/08 | \$1,250,000 | | |

TMC handles 700 to 800 incidents annually, as of July 2003.

An incident can be a wreck, an event, a stalled car, or other unforeseen delay.

Detection Infrastructure

| | June 2003 | June 2006 | June 2009-Buildout |
|---|-------------------|-------------------------------------|--------------------|
| inductive loop-corridor | 60 stations | 60 stations | 60 stations |
| inductive loop-intersection | 265 intersections | 12 per each signalized intersection | 350 intersections |
| radar detectors @ 1 per mile, mid-block | 0 | 0 | 0 |
| CCTVs | 7 | 75 | 88 |
| Machine Vision | 36 | 36 | 36 |
| By the end of fiscal year 2003/04, 31 additional cameras will have been installed and connected to the TMC. | | | |

SERVICE AREA-ITS MAINTENANCE

Maintenance is an activity that is required throughout the TMC life cycle to ensure that the system operates as originally planned and designed. It is a series of methodical, ongoing activities designed to minimize the occurrence of systemic failures and to mitigate their impacts when failures do occur. Key measures are response and down times, and life cycle cost.

Goal

The goal of ITS Maintenance in the City of Scottsdale is to maintain infrastructure in excellent operating condition so that preventable roadway delay is avoided, and roadway safety is enhanced.

Objectives

- Issue Requests for Proposals for Maintenance Contractors for fiber, wireless and CCTVs with a 24-hour response clause by December 2003.
- Develop a preventive maintenance program for ITS devices by July 2005.
- Track failures by device to eliminate re-occurring failures of the same nature by December 2003.
- Implement an inventory and spares policy, and work order system by July 2005.
- Implement an As-Built & Blue Stake Program related to existing ITS facilities so that locations can be “painted” within 48 hours of notification, by July 2004.
- Retrofit existing signal communication software and hardware to become Ethernet compatible by July 2005.

ROLES AND RESPONSIBILITIES

PLANNING

Transportation Department-TMC
Municipal Services
Budget

SECURITY

Transportation Department
Information Systems

IMPLEMENTATION

Transportation Department-TMC
Traffic Signal Crew

OPERATIONS & MAINTENANCE

Transportation Department-TMC
Information Systems
Municipal Services/Traffic Signal Crew/Contractors

PROGRAMS/PROJECTS REQUIRED

Program 1: Respond to ITS outages promptly, such that traffic delay is minimized and public safety is enhanced, through ITS Technician, Traffic Signal Crew, and Contractor functions.

Program 2: Continuously keep abreast of advances in technology that relate to ITS, through formal classroom training, regional work groups, professional societies, and publications, to hold steady or reduce system lifecycle costs.

Project A: Evaluate migration of ITS communication to Ethernet, the City standard.

Project B: Determine the appropriate staff resources required at each phase of ITS deployment.

Project C: Evaluate the establishment of an equipment replacement reserve account for ITS.

Project D: Evaluate the implementation of a fiber management system with automatic re-routing.

Costs To Be Determined

RESOURCES REQUIRED AND ESTIMATED COSTS

CAPITAL IMPROVEMENTS REQUIRED

Maintain ITS spare parts inventory: 3 CCTV spares at \$5000 each; various CCTV spares at \$10,000; 1 visible light source, \$500; 2 ruggedized laptops for field troubleshooting at \$6000 each; 1 spare Variable Message Sign (custom sized for Scottsdale) at \$30,000; various VMS spares at \$10,000; various fiber optic spares, \$10,000; 200 square feet of storage space in One Civic for spares. Total \$87,500.

Optical Time Domain Reflectometer for analysis of fiber breakdowns with power meter, @ \$15,000.

50 square feet of space and equipment for test bench for ITS equipment @\$10,000

As maintenance workload and staff increase, would need 1 high 65-foot bucket truck @ \$67,000; 1 bucket/van @ \$43,000; 1 equipment/splicing van @ \$49,000; additional tools and laptops, workstations, workbenches and storage for manuals, tools, parts and supplies.

Costs To Be Determined

HUMAN RESOURCES/STAFF REQUIRED

Per MAG ITS Strategic Plan, maintenance for a large TMC such as Scottsdale's (based on number of ITS devices including number of signals) would require 10 staff: 2 forepersons; 2 field technicians; and 6 electronics technicians.

MAG ITS Strategic Plan suggests that a defensible estimate of costs are: Personnel, \$600,000 a year and physical plant, equipment, and operating expense at \$1,167,700, for a total annual field maintenance budget of \$1,856,400.

Costs for personnel, plant, equipment and operations total budget \$1,856,400 annually

INSTITUTIONAL ARRANGEMENTS REQUIRED

Maintenance agreements with Arizona Department of Transportation and other municipalities, especially for after-hours maintenance requirements.

Potential for developing a joint maintenance agreement with regional partners, and for pooled expensive maintenance equipment such as bucket trucks and fiber equipment.

Costs MAG suggests 1 electrician for every 100 ITS devices and 1 electrician for every 400 miles of cable

ADDITIONAL INFORMATION

ITS Technical Team decided to continue contracting for cable breaks until more experience with needs is gained. Staff will continue to evaluate the cost/benefit of staff in-house for long fiber runs. Keeping current equipment and training for staff is costly unless clearly justified by the workload.

MAG ITS Regional Concept of Transportation Operations suggested that in general, software and hardware maintenance, traffic signal re-lamping, VMS and communication maintenance, and system administration lend themselves to outsourcing. For fiber optic system maintenance, agency can provide front line assessment and contractor repair. Scottsdale has chosen the latter model.

Current ITS failure experience:

- 5 to 10 traffic line circuits are down each month, of the 44 total circuits.
- 1 or 2 of the T1 lines from Qwest go down each week.
- Most frequent breakdowns are caused by lightning or rain.
- Lightning will take out a CCTV on average one time each year, of the 42 machine vision and CCTVs currently installed.
- The more the infrastructure ages, the more maintenance cost can be expected. Off-hour equipment failures are not critical right now. Can be done by contractor.

ACHIEVEMENT CHALLENGES

- Traffic Signal crews are not co-located with ITS/TMC, and are under the direction of a different department.

SERVICE AREA—WORK ZONES

ITS applications including traffic management, traveler information, and incident management are used to enhance the safety and efficiency of work zones for road users and roadway workers. Key measures are reduction in road closures and in accidents.

Goal

The goal of work zone management is to enhance the safety of the public and to reduce roadway delay. Work zone management will also track and update City worker construction and maintenance.

Objective

- Implement the Roadway Condition Reporting System (RCRS) capability of AZTech by July 2004.
- Incorporate the Right-of-Way management document into the City's Design Standards and Policies Manual by July 2004.

ROLES AND RESPONSIBILITIES

PLANNING

Transportation Department
Capital Projects Management
Planning/One Stop Shop
Inspection Services

SECURITY

Transportation Department
Information Systems
Contractors

IMPLEMENTATION

Transportation Department
Other area TOCs, ADOT, Media

OPERATIONS & MAINTENANCE

Transportation Department
One Stop Shop
Inspection Services

PROGRAMS/PROJECTS REQUIRED

Program 1: Transportation Department review and approval of traffic control and construction barricade plans in the ROW, as a prerequisite to encroachment permit approval.

Program 2: Public notification of City-approved barricades via VMS and media outlets, and verification via CCTVs of barricade removal upon permit expiration.

Program 3: Updates continually made to the ROW encroachment map on GIS.

Project A: Determine feasibility of certifying barricade companies or construction companies who do an effective job of designing traffic control plans at work zones, who timely notify the City and who timely remove barricades. Pre-certified companies would not have to go through full review process.

Project B: Determine the relationship between the Police Department pre-determined incident detour routes and the desired traffic control plan at work zones to see if the CD with detour plans could be provided to barricade companies.

Project C: Determine the desirability of providing Work Zone and traffic control plan information to the City Police Department.

Costs To Be Determined

RESOURCES REQUIRED AND ESTIMATED COSTS

CAPITAL IMPROVEMENTS REQUIRED

See Incident Detection Service Area Plan

Costs To Be Determined

HUMAN RESOURCES/STAFF REQUIRED

According to the MAG Strategic Plan, 1 fulltime staff is required for administration of the Roadway Condition Reporting System.

Costs To Be Determined

INSTITUTIONAL ARRANGEMENTS REQUIRED

See Incident Detection Service Area Plan

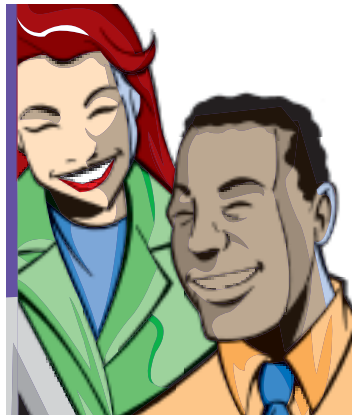
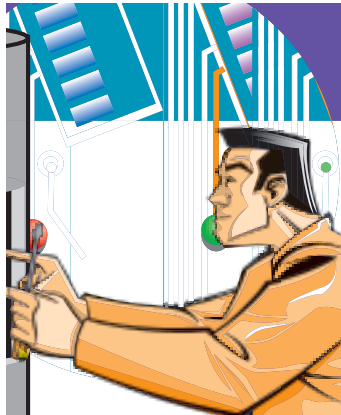
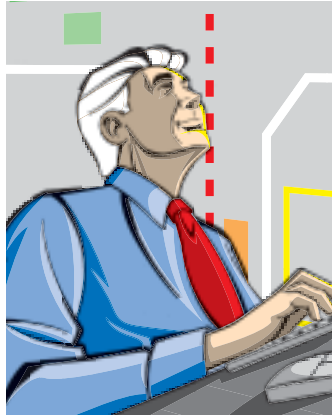
Costs To Be Determined

ADDITIONAL INFORMATION

In 2001, a City Rights-of-Way project resulted in suggested changes to Chapter 47 of the Scottsdale Revised Code, a revised Rights of Way manual intended for adoption in the DSPM, and changed practices in Planning, Inspection Services, and Transportation. The program was never taken to City Council as intended for adoption and budget. The barricade map was implemented as a stopgap until the program could be staffed by a ROW manager.

ACHIEVEMENT CHALLENGES

- The AZTech server and the communications to McDOT are scheduled to be operational by Winter 2003.
- A process for TMC support of the Transportation Department Right-of-Way initiative needs to be developed.



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